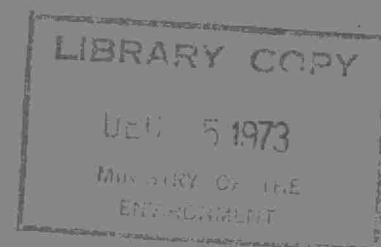


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OPERATING SUMMARY

THUNDER BAY



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MINISTRY OF THE ENVIRONMENT

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Ontario

Ministry of the
Environment

135 St. Clair Avenue West
Toronto 195, Ontario

We are pleased to present you with the 1972 operating summary for the water pollution control plant serving your community.

This summary contains data on the performance of the plant as well as relevant financial information. Of particular interest is the review of the year's activities in which significant items of these data are discussed in some detail by the operations engineer and his staff who, by their day-to-day involvement with the operation, are thoroughly familiar with the plant.

We appreciate your continuing interest in protecting the environment through the efficient operation of this wastewater treatment facility.

D.S. Caverly,
Assistant Deputy Minister.

D.A. McTavish, P. Eng.,
Director,
Project Operations Branch.

MINISTRY OF THE ENVIRONMENT

MINISTER
Honourable James A. C. Auld

DEPUTY MINISTER
E. Biggs

ASSISTANT DEPUTY MINISTER
D. S. Caverly

EXECUTIVE DIRECTOR
K. H. Sharpe

PROJECT OPERATIONS BRANCH

DIRECTOR
D. A. McTavish

ASSISTANT DIRECTOR
C. W. Perry

ACTING REGIONAL SUPERVISOR
B. W. Hansler

OPERATIONS ENGINEER
E. Czarnecki

135 St. Clair Avenue West
Toronto 195

THUNDER BAY
WATER POLLUTION CONTROL PLANTS

operated for
THE CITY OF THUNDER BAY
by the
MINISTRY OF THE ENVIRONMENT

1972 ANNUAL OPERATING SUMMARY

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'72 Review

GENERAL

The Water Pollution Control system is now referred to as the Thunder Bay Water Pollution Control System, North and South plants. It is expected that plant expansion will begin in 1973 at the South plant. Flows from the North ward will be conducted to the enlarged South plant.

Both plants including the Brunswick Avenue pumping station were operated seven days a week with a total staff of twelve which includes the superintendent and chief operator.

EXPENDITURES

The total operating cost was \$193,909.76. This represented an average cost of \$21.36 per million gallons treated and 25 cents per pound of BOD removed.

PLANT FLOWS AND CHLORINATION

A total of 1849 million gallons was treated at the South plant whereas 2297 million gallons was received at the North plant. The South average daily flow was 5.06 million gallons compared to 6.22 million gallons in 1971. The average daily flow represented 94.3 percent of the nominal design capacity. Chlorination was carried out on a regular basis at an average dosage of 3.9 mg/l. A total of 72,500 pounds of chlorine was used.

The North plant daily flow was 6.29 million gallons which was a slight increase over 1971. The average daily flow represents 157.3 percent of the nominal design flow of 4.0 million gallons per day. Chlorination was carried out from April to December at an average dosage of 3.8 mg/l. A total of 56,600 pounds of chlorine was used.

It should be noted that there is bypassing at the North plant during run-off and storm conditions.

PLANT EFFICIENCY

The South plant average influent BOD concentration was 128 mg/l. An average reduction of 29 percent was realized with an average effluent BOD concentration of 91 mg/l. The average influent suspended solids concentration was 129 mg/l which was reduced to an average of 68 mg/l, a 47 percent reduction.

The North plant average influent BOD concentration was 138 mg/l. An average reduction of 35 percent was realized with an average effluent BOD concentration of 90 mg/l. The average influent suspended solids concentration was 155 mg/l which was reduced to 75 mg/l, a 52 percent reduction. The bypassed flow was not treated.

SLUDGE DIGESTION AND DISPOSAL

A total of 4.873 million gallons of raw sludge with an average total solids concentration of 3.6 percent was pumped to the digesters at the South plant. A total of 761,000 gallons was removed from the digester with a total solids content of 10.2 percent. The volatile solids content was reduced from 67 to 37 percent in the digesters.

A total of 5.787 million gallons of raw sludge with a total solids concentration of 2.9 percent was pumped to the digesters at the North plant. A total of 1.467 million gallons was removed from the digesters. The total solids content was 7.4 percent and the volatile solids concentration remained at 67 percent.

CONCLUSIONS

Both plants produced satisfactory reductions of BOD and suspended solids despite flows which were above the design capacity almost 100 percent of the time. However, the bypassed flows at the North plant received no treatment. Sludge treatment at the North plant is almost nil due to the overloaded condition of the digester.

PROJECT COSTS

2-0091-61 NET CAPITAL COST	\$2,589,550.83
DEDUCT - Portion financed by CMHC (Final)	<u>(1,722,029.58)</u>
Long Term Debt to MOE	\$ <u>867,521.25</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1972	\$ <u>165,037.55</u>
Net Operating	\$ 193,949.96
Debt Retirement	10,442.00
Reserve	10,774.77
Interest Charged	<u>48,649.69</u>
TOTAL	\$ <u>263,816.42</u>

RESERVE ACCOUNT

Balance @ January 1, 1972	\$ 90,677.24
Deposited by Municipality	10,774.77
Interest Earned	<u>6,081.55</u>
	\$ 107,533.56
Less Expenditures	<u>1,165.50</u>
Balance @ December 31, 1972	\$ <u>106,368.06</u>

PROJECT COSTS

2-0101-62 NET CAPITAL COST	\$699,693.96
DEDUCT - Portion financed by CMHC (Final)	<u>(457,785.36)</u>
Long Term Debt to MOE	<u>\$241,908.60</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1972	\$ <u>55,405.39</u>
Net Operating	\$ -
Debt Retirement	2,606.00
Reserve	2,417.43
Interest Charged	<u>13,565.98</u>
TOTAL	\$ <u>18,589.41</u>

RESERVE ACCOUNT

Balance @ January 1, 1972	\$ 44,221.57
Deposited by Municipality	2,417.43
Interest Earned	<u>2,896.20</u>
	\$ 49,535.20
Less Expenditures	<u>-</u>
Balance @ December 31, 1972	\$ <u>49,535.20</u>

PROJECT COSTS

2-0156-63 NET CAPITAL COST	\$610,181.87
DEDUCT - Portion financed by CMHC (Final)	<u>(393,042.83)</u>
Long Term Debt to MOE	<u>\$217,139.04</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1972	\$ <u>41,172.84</u>
Net Operating	\$ -
Debt Retirement	2,624.00
Reserve	1,599.92
Interest Charged	<u>12,176.94</u>
TOTAL	\$ <u>16,400.86</u>

RESERVE ACCOUNT

Balance @ January 1, 1972	\$ 20,728.08
Deposited by Municipality	1,599.92
Interest Earned	<u>1,369.53</u>
	\$ 23,697.53
Less Expenditures	<u>-</u>
Balance @ December 31, 1972	\$ <u>23,697.53</u>

PROJECT COSTS

2-0173-64
NET CAPITAL COST \$28,502.68

DEDUCT - Portion financed by

Long Term Debt to MOE \$28,502.68

Debt Retirement Balance at Credit
(Sinking Fund) December 31, 1972 \$ 4,890.24

Net Operating \$
Debt Retirement 339.00
Reserve 116.89
Interest Charged 1,598.41

TOTAL \$ 2,054.30

RESERVE ACCOUNT

Balance @ January 1, 1972 \$ 1,299.78

Deposited by Municipality 116.89

Interest Earned 86.36

\$ 1,503.03

Less Expenditures -

Balance @ December 31, 1972 \$ 1,503.03

PROJECT COSTS

2-0175-64 NET CAPITAL COST	\$835, 832. 42
DEDUCT - Portion financed by CMHC (Final	<u>(581, 864. 23)</u>
Long Term Debt to MOE	<u>\$253, 968. 19</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1972	\$ <u>32, 530. 70</u>
Net Operating	\$
Debt Retirement	3, 096. 00
Reserve	3, 016. 63
Interest Charged	<u>14, 242. 27</u>
TOTAL	\$ <u>20, 354. 90</u>

RESERVE ACCOUNT

Balance @ January 1, 1972	\$ 18, 070. 83
Deposited by Municipality	3, 016. 63
Interest Earned	<u>1, 231. 11</u>
	\$ 22, 318. 57
Less Expenditures	<u>—</u>
Balance @ December 31, 1972	\$ <u>22, 318. 57</u>

PROJECT COSTS

2-0013-58 NET CAPITAL COST	\$2, 157, 635. 72
DEDUCT - Portion financed by MUNICIPAL ADVANCES	<u>(1, 478. 20)</u>
Long Term Debt to MOE	<u>\$2, 156. 157. 52</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1972	\$ <u>789. 726. 76</u>
Net Operating	\$ -
Debt Retirement	15, 919. 00
Reserve	
Interest Charged	<u>120, 915. 08</u>
TOTAL	\$ <u>136, 834. 08</u>

RESERVE ACCOUNT

Balance @ January 1, 1972	\$ 165, 671. 01
Deposited by Municipality	-
Interest Earned	<u>10, 865. 12</u>
	\$ 176, 536. 13
Less Expenditures	<u>-</u>
Balance @ December 31, 1972	\$ <u>176, 536. 13</u>

PROJECT COSTS

2-0050-60 NET CAPITAL COST	\$1, 336, 345.25
DEDUCT - Portion financed by CMHC(Final)	<u>(855, 626.69)</u>
Long Term Debt to MOE	\$ <u>480, 718.56</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1972	\$ <u>121, 402.97</u>
Net Operating Debt Retirement Reserve	\$ 5, 147.00
Interest Charged	<u>26, 958.20</u>
TOTAL	\$ <u>32, 105.20</u>

RESERVE ACCOUNT

Balance @ January 1, 1972	\$ 96, 149.53
Deposited by Municipality	
Interest Earned	<u>6, 305.73</u>
	\$ 102, 455.26
Less Expenditures	<u>-</u>
Balance @ December 31, 1972	\$ <u>102, 455.26</u>

1972 COSTS

OPERATING COSTS

● PAYROLL	54 %
● FUEL	3 %
● POWER	12 %
● CHEMICALS	8 %
● GENERAL SUPPLIES	3 %
● EQUIPMENT	<1 %
● REPAIRS & MAINTENANCE	6 %
● SUNDRY	10 %
● WATER	3 %
● TRAVEL	<1 %

TOTAL ANNUAL COST

NET OPERATING	40 %
DEBT RETIREMENT	8 %
RESERVE	4 %
INTEREST	48 %

YEARLY OPERATING COSTS

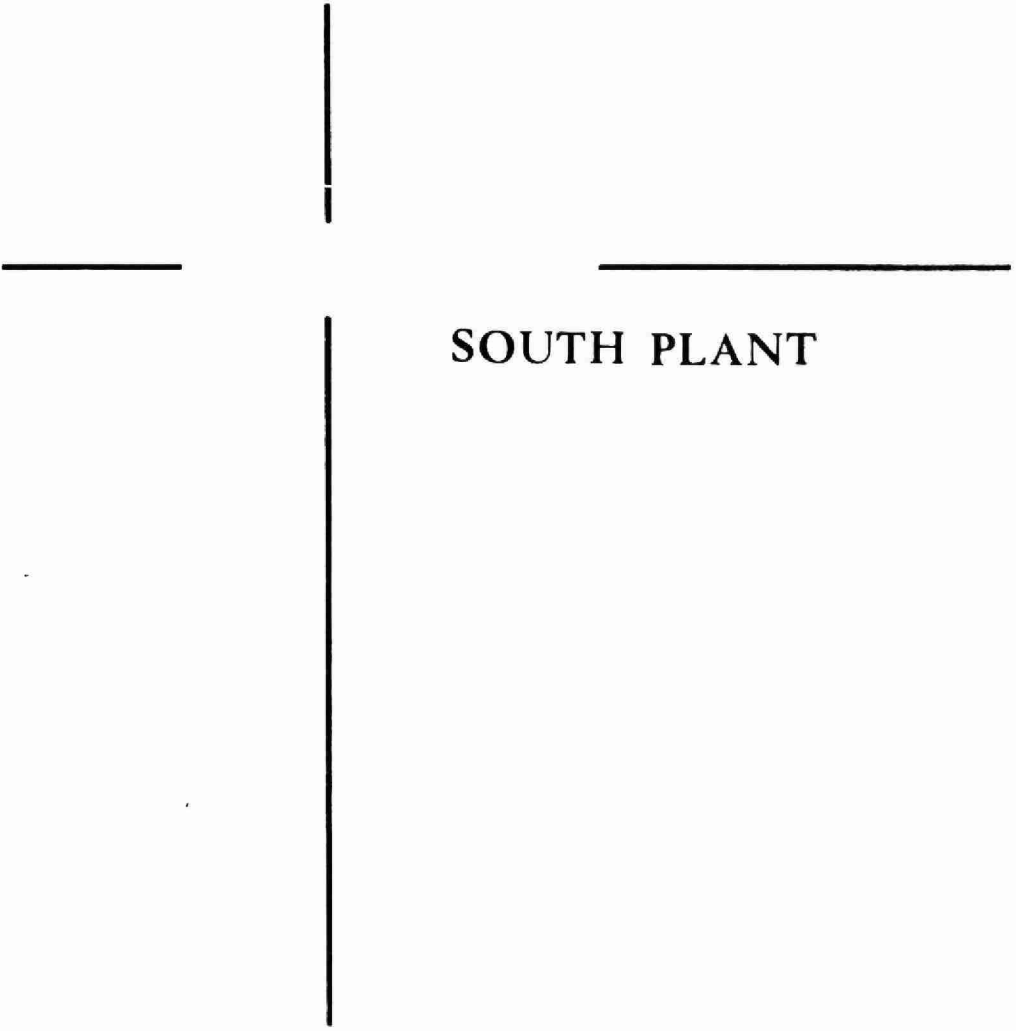
YEAR	SEWAGE TREATED in million gallons	TOTAL OPERATING COSTS	TREATMENT COSTS	
			\$ per million gal	¢ per lb BOD
1968	4046.80	143,187.43	35.4	8 cents
1969	3516.00	146,958.57	41.8	6 cents
1969	4086.20	203,947.65	50.0	8 cents
1971	4355.9	192,017.60	42.1	7 cents
1972	4146.0	193,909.76	93.3	7 cents

MONTHLY OPERATING COSTS

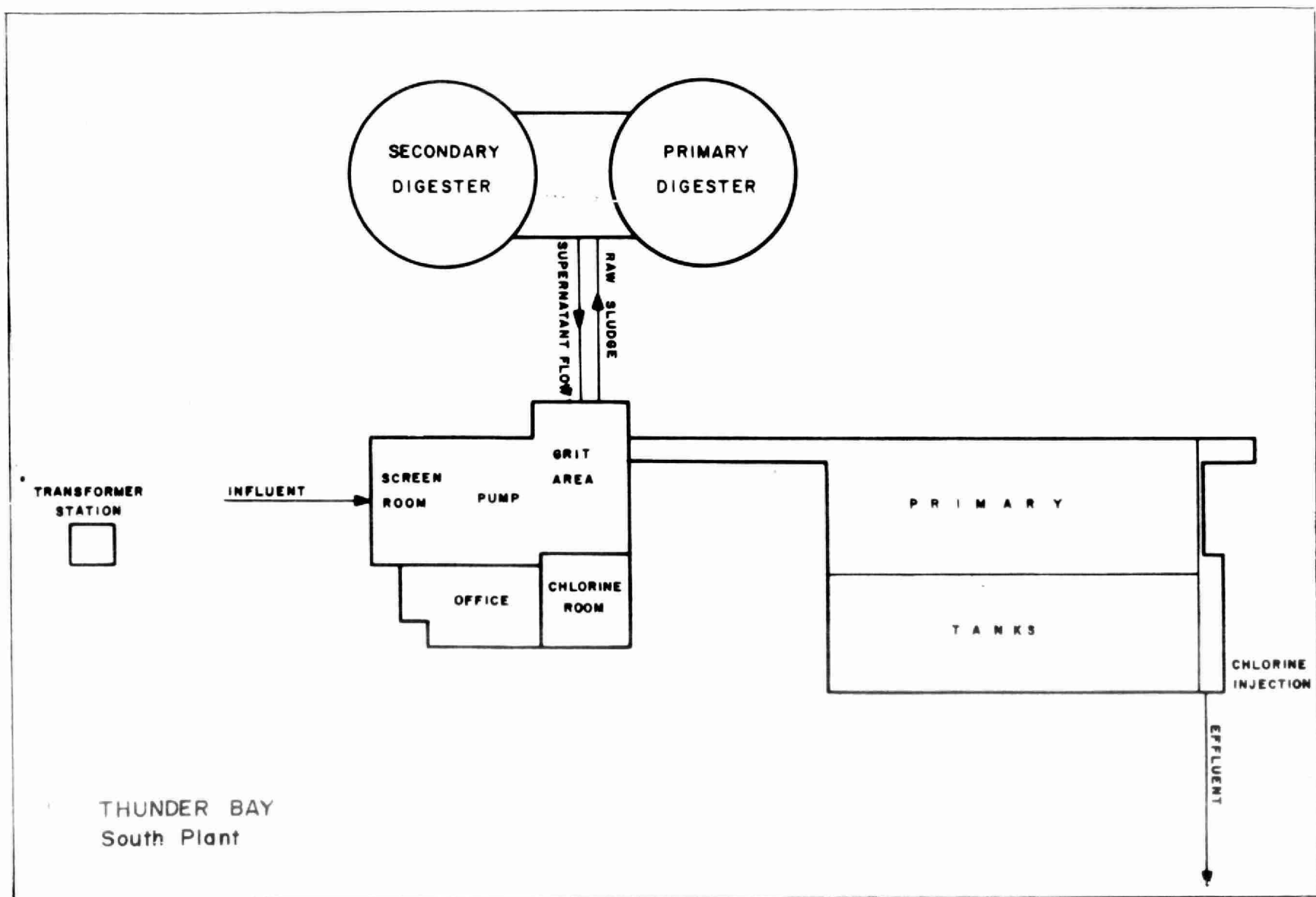
MONTH	TOTAL EXPENDITURE	REGULAR PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY*	WATER	TRAVEL
JAN	9999.67	6873.14	444.73	633.95	1811.58		30.00		66.96	139.31		
FEB	14738.51	7682.90	215.14	622.02	1586.06	2032.00	471.02	(167.72)	507.11	774.88	980.64	34.46
MAR	12905.97	8119.92	28.37	561.91	1576.18		358.15	52.75	689.20	1482.74		36.75
APR	16560.62	8875.80		495.18	2035.36	66.00	905.93		1333.89	1152.95	1453.60	241.91
MAY	14499.74	8219.54		905.65	2113.27		435.32		1245.00	1532.32		48.64
JUNE	20429.63	12087.49	683.89	804.43	2076.20	3556.00	653.95		478.17	64.06		25.44
JULY	7005.98	199.27		427.83	2076.23		314.74	83.83	1762.18	112.14	1905.28	24.48
AUG	11170.95	7121.39	836.56	441.03	2017.17		227.95		452.66	22.87		52.32
SEPT	16556.40	7693.44	840.45	131.86	159.80	2587.00	513.29	74.03	1660.40	2863.65		32.48
OCT	14816.42	7065.61	148.05	705.99	1720.82	1990.00	344.38	70.30	320.36	2421.63		29.28
NOV	16212.06	344.21		549.50	3953.11		401.14		300.28	8461.93	2106.72	95.17
DEC	39013.81	24785.35	2062.10	429.18	2058.88	5174.00	1377.56	143.36	1968.80	956.34		58.24
TOTAL	193909.76	99068.06	5259.29	6808.53	23184.66	15405.00	6033.43	256.55	10784.01	19984.82	6446.24	679.17

Brackets indicate credit.

* Sundry includes sludge haulage costs of \$15,301.00



SOUTH PLANT



DESIGN DATA

PROJECT NO. 2-0091-61

TREATMENT Primary

DESIGN FLOW 6.0 mgd

DESIGN POPULATION 48,000

PRIMARY TREATMENT

Screening

- Trash Racks
Type: Jeffrey
Size: Two with 3" spacing
- Grinder
Type: Jeffrey (One)
- Coarse bar screens
Type: David Brown
Size: Two with 1" spacing

Sewage Lift Pumps

Type: Fairbanks-Morse
Size: Two 5140 gpm @ $36\frac{1}{2}'$ tdh
Two 3490 gpm @ $36\frac{1}{2}'$ tdh
(variable speed, electric)

Grit Removal

Type: Aerated; grit removed by
clamshell bucket
Size: One 29' x 25' x 15' deep
Retention: 1.5 min

Primary Sedimentation

Type: Jeffrey
Size: Two 132' x 37' x 10' avg
(622,000 gal)

Retention: 2.5 hours
Loading: Surface, 600 gal/ft²/day
Weir, 10,000 gal/ft/day

CHLORINATION

W & T

Chlorine Contact Chamber

- in effluent chamber

OUTFALL

- to Kam River

SLUDGE HANDLING

Digestion System

Type: Two-stage

Primary --

Type - Gas mixed PFT

Size - One 60' dia (71,000 cu ft or
442,000 gal)

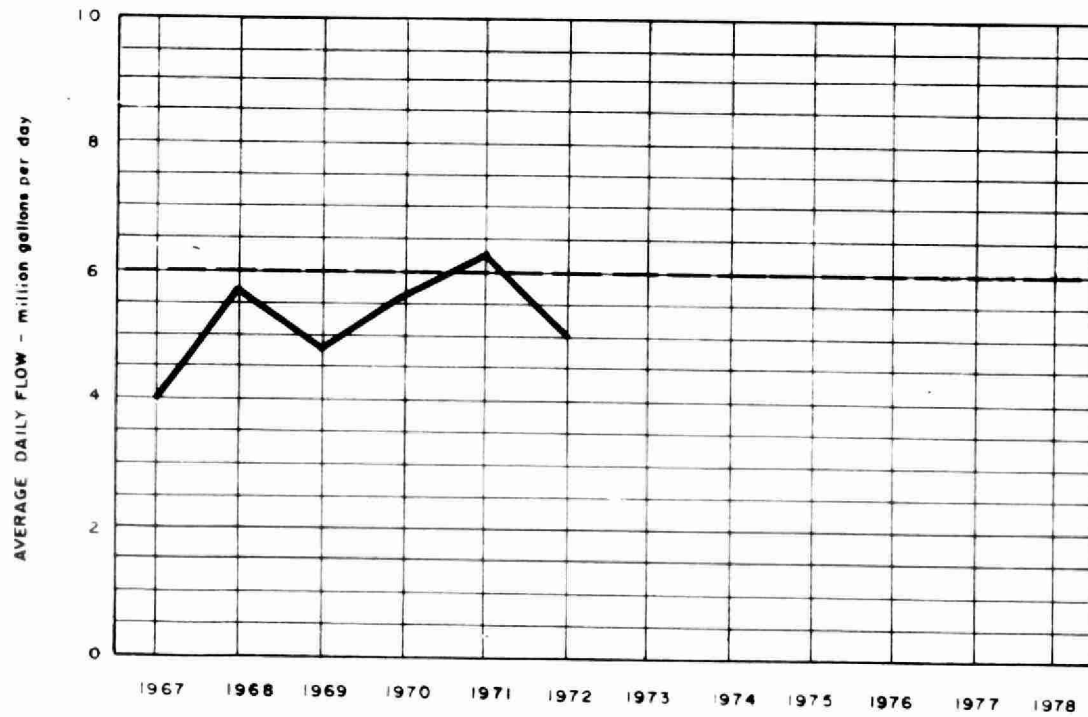
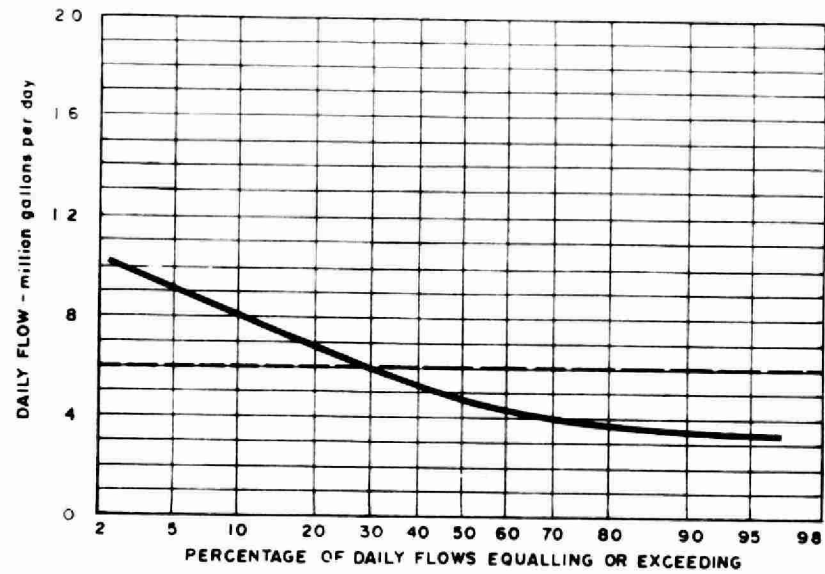
Loading - 3.0 lb/ft³/mo

Secondary --

Size - One 60' dia (71,000 cu ft or
442,000 gal)

Total Loading - 1.5 lb/ft³/mo

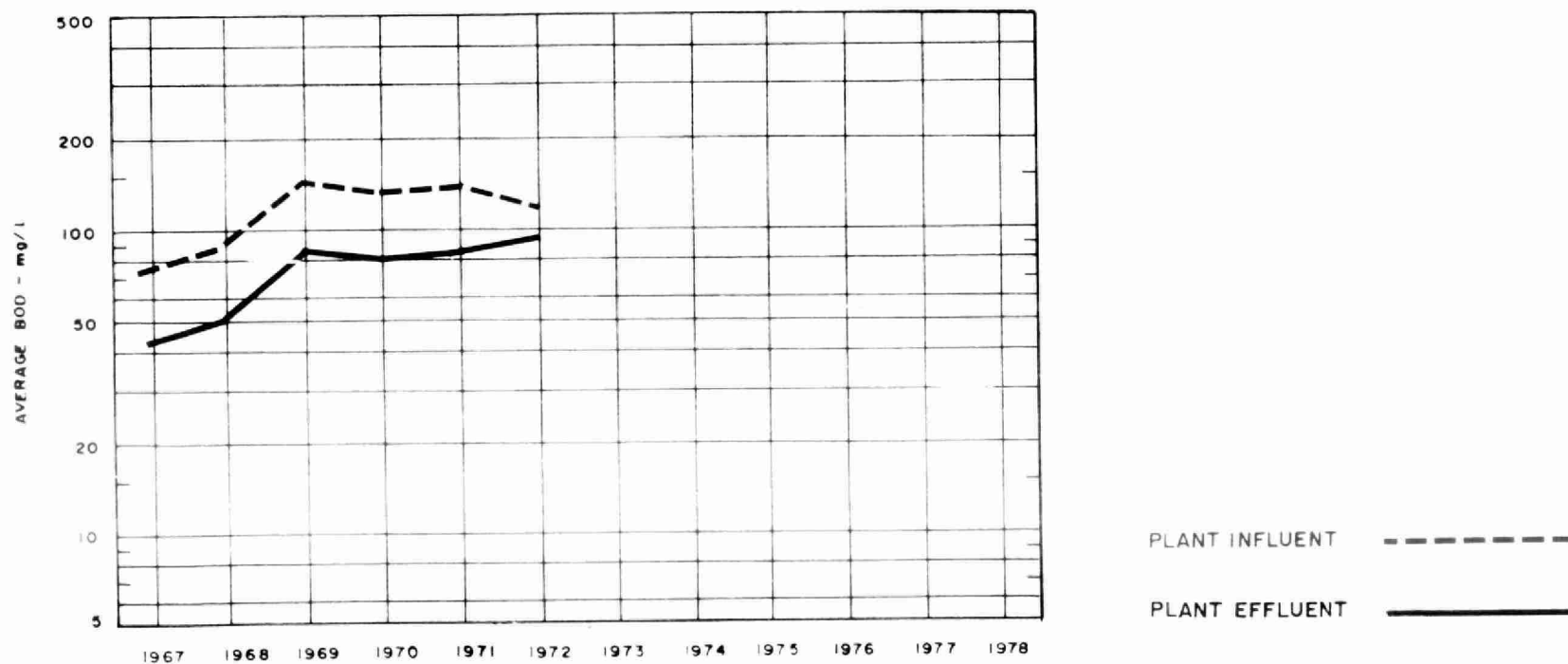
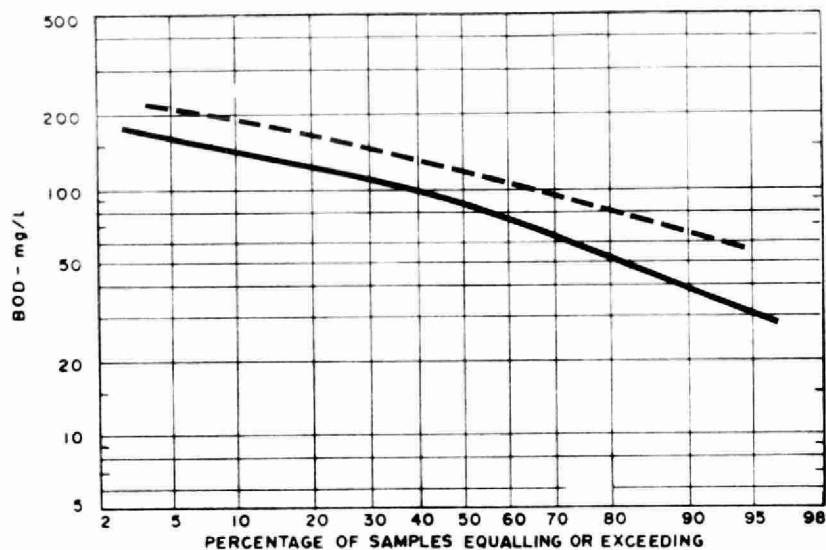
FLOWS



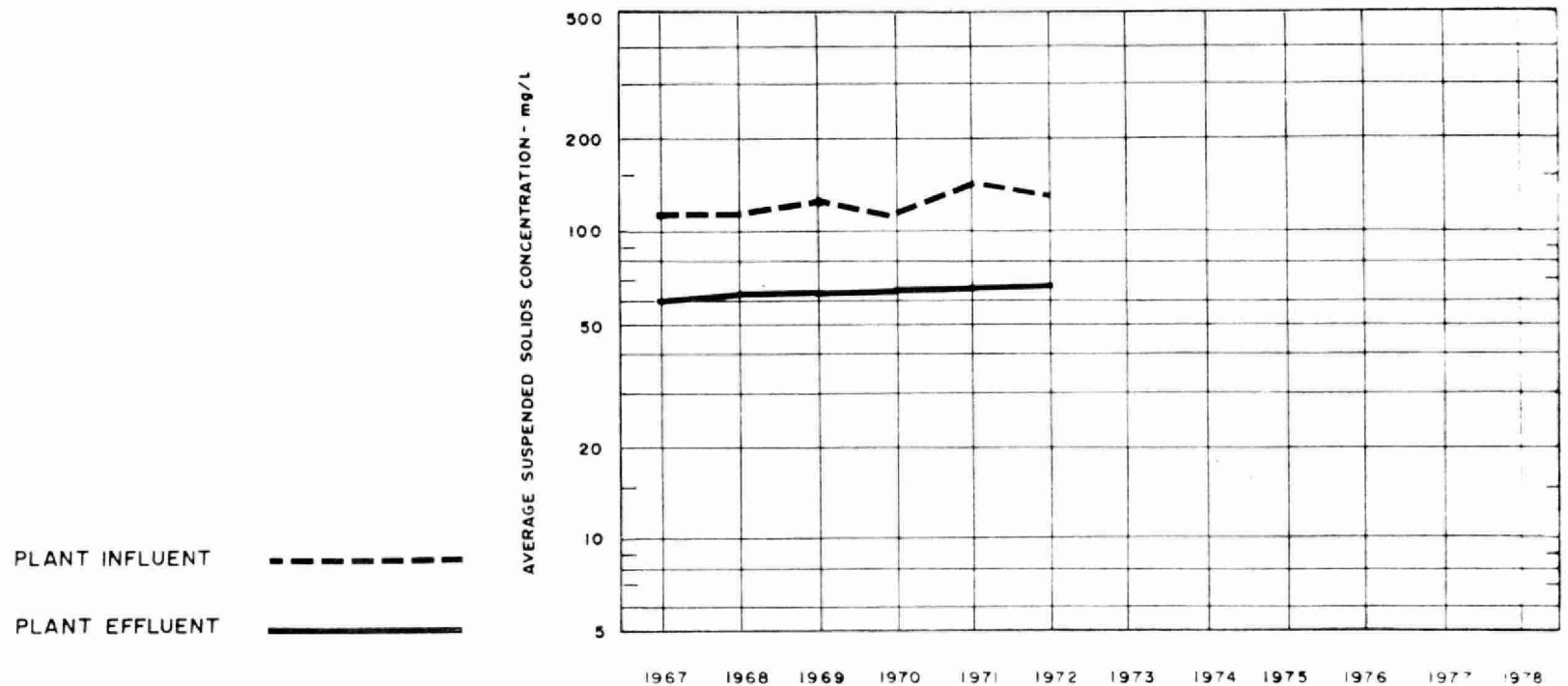
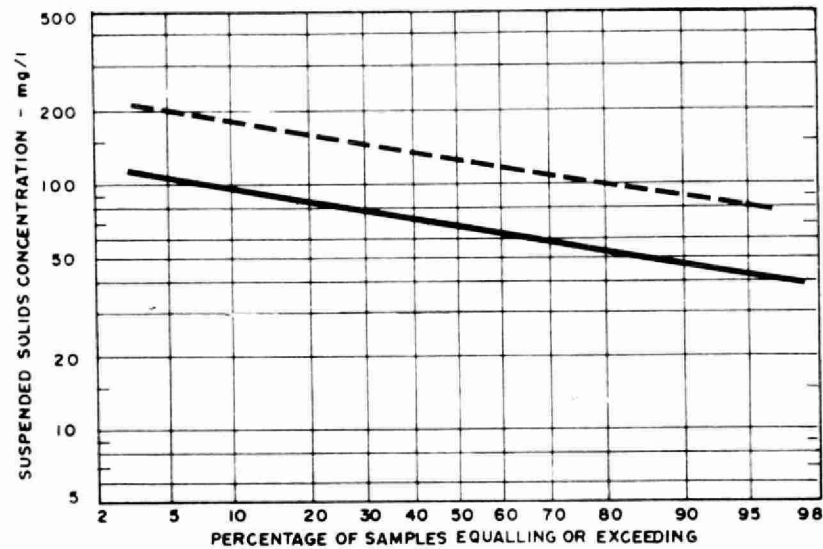
PLANT PERFORMANCE

MONTH	FLOWS			BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				PHOSPHORUS	
	TOTAL FLOW	AVERAGE DAY	MAXIMUM DAY	INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT
	million gallons	mil. gal	mgd	mg/l	mg/l	%	10 ³ pounds	mg/l	mg/l	%	10 ³ pounds	mg/l P	mg/l P
JAN	117	3.8	4.2	167	126	25	48	146	69	53	89	7.8	6.8
FEB	107	3.7	4.1	173	96	44	82	178	64	64	122	5.9	5.1
MAR	124	4.0	6.8	142	120	15	27	110	60	45	63		
APR	212	7.1	12.8	164	84	49	170	206	99	52	227	5.8	4.8
MAY	199	6.4	8.4	117	74	37	86	127	68	46	117	3.1	3.6
JUNE	182	6.1	11.1	79	51	35	51	95	50	47	82	4.6	3.5
JULY	197	6.4	11.0	122	91	26	61	103	56	45	93	5.3	3.6
AUG	164	5.3	8.5	136	77	43	96	135	84	38	83	2.8	2.0
SEPT	151	5.0	10.8	113	79	30	51	144	72	50	108	5.6	3.6
OCT	144	4.6	7.6	106	80	25	37	98	60	39	54	4.6	3.1
NOV	137	4.6	6.4	121	102	16	26	107	68	36	53	4.7	3.8
DEC	115	3.7	4.4	121	119	1	2	127	82	35	52	6.2	6.4
TOTAL	1849	-	-	-	-	-	737	-	-	-	1143	-	-
AVG.		5.0	MAXIMUM 12.8	128	91	29	61	129	68	47	95	5.1	4.2
No. of Samples	-	-	-	55	55	-	-	55	55	-	-	11	11

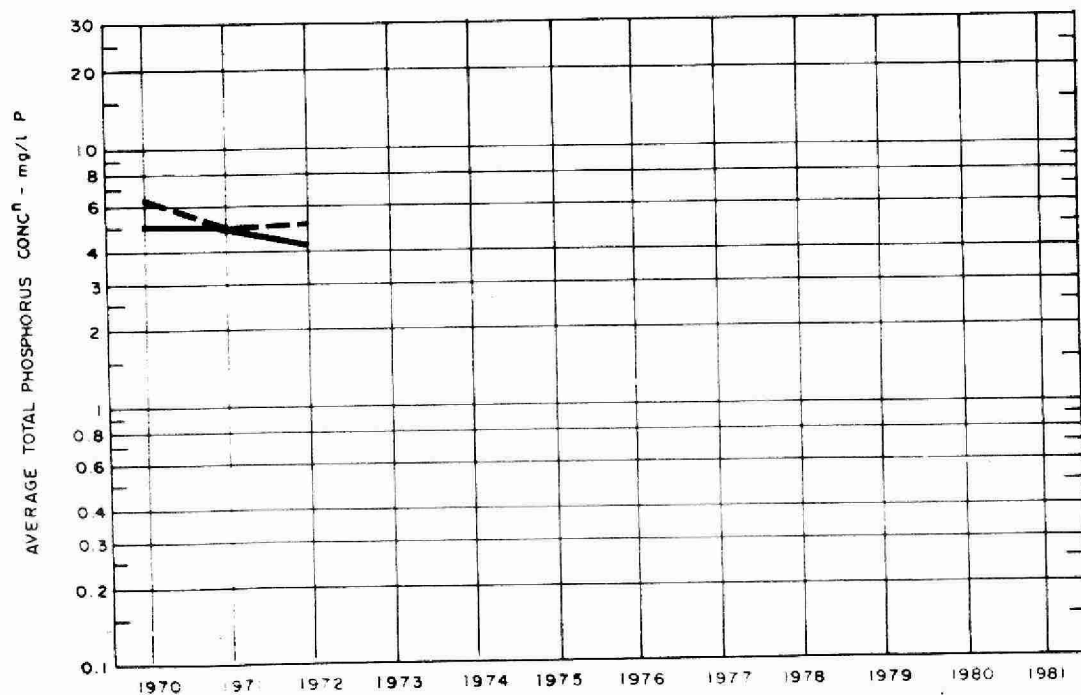
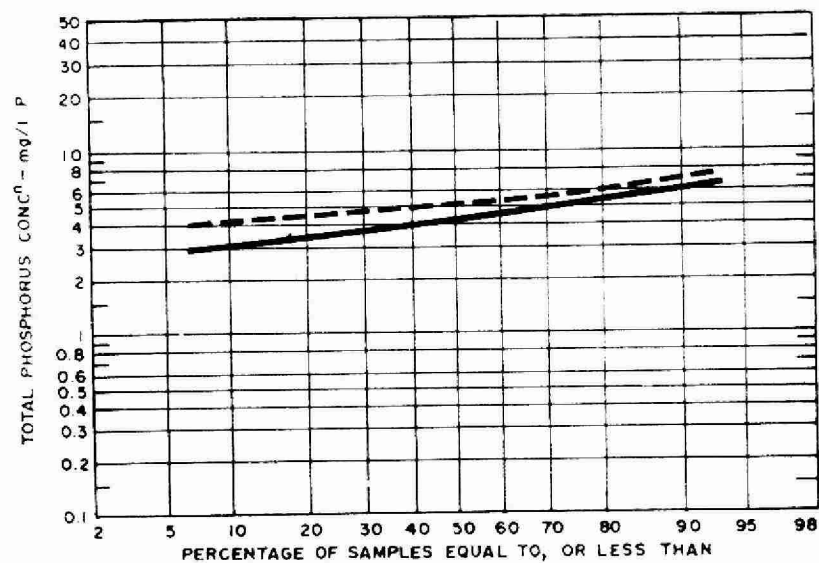
BIOCHEMICAL OXYGEN DEMAND



SUSPENDED SOLIDS



PHOSPHORUS

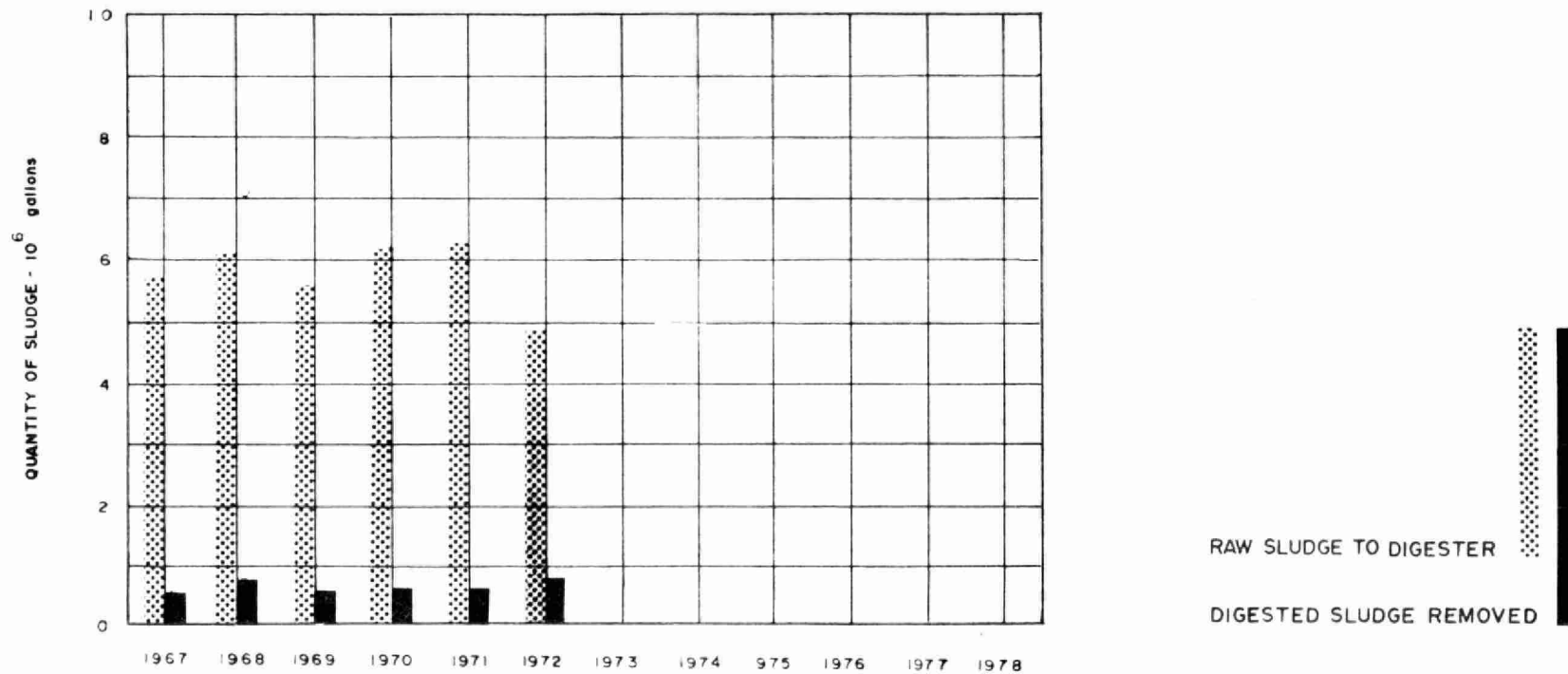
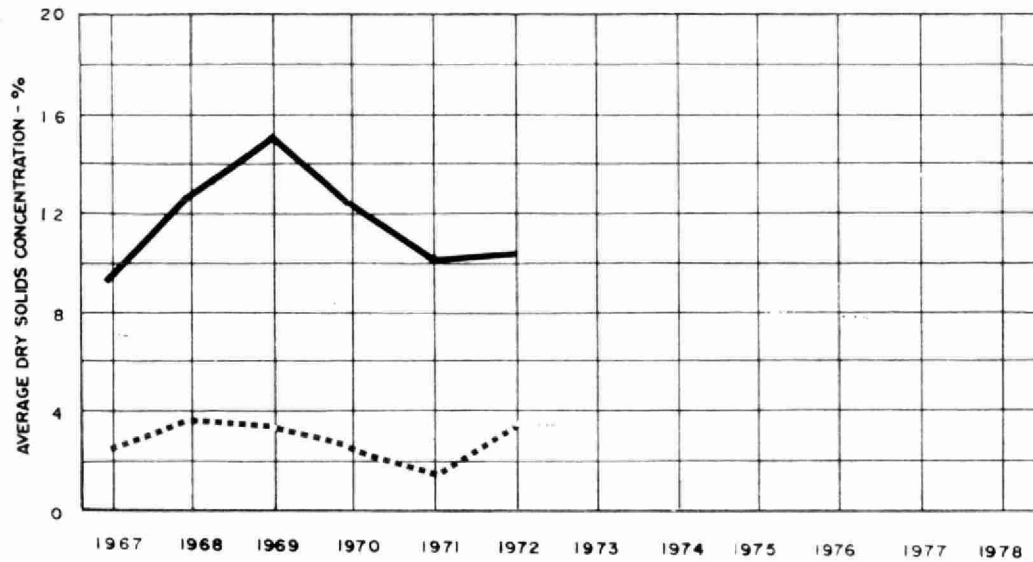


PLANT INFLUENT

PLANT EFFLUENT

DIGESTION

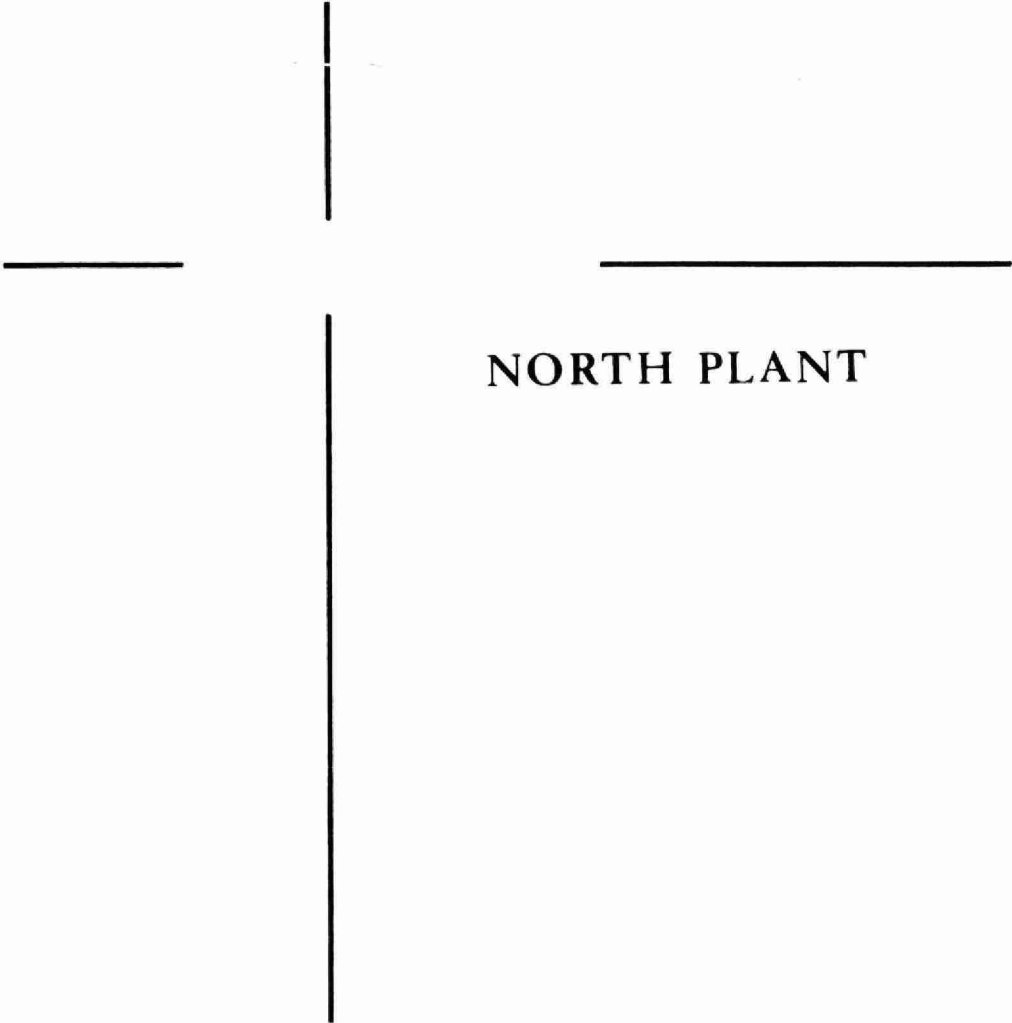
RAW SLUDGE
DIGESTED SLUDGE ———



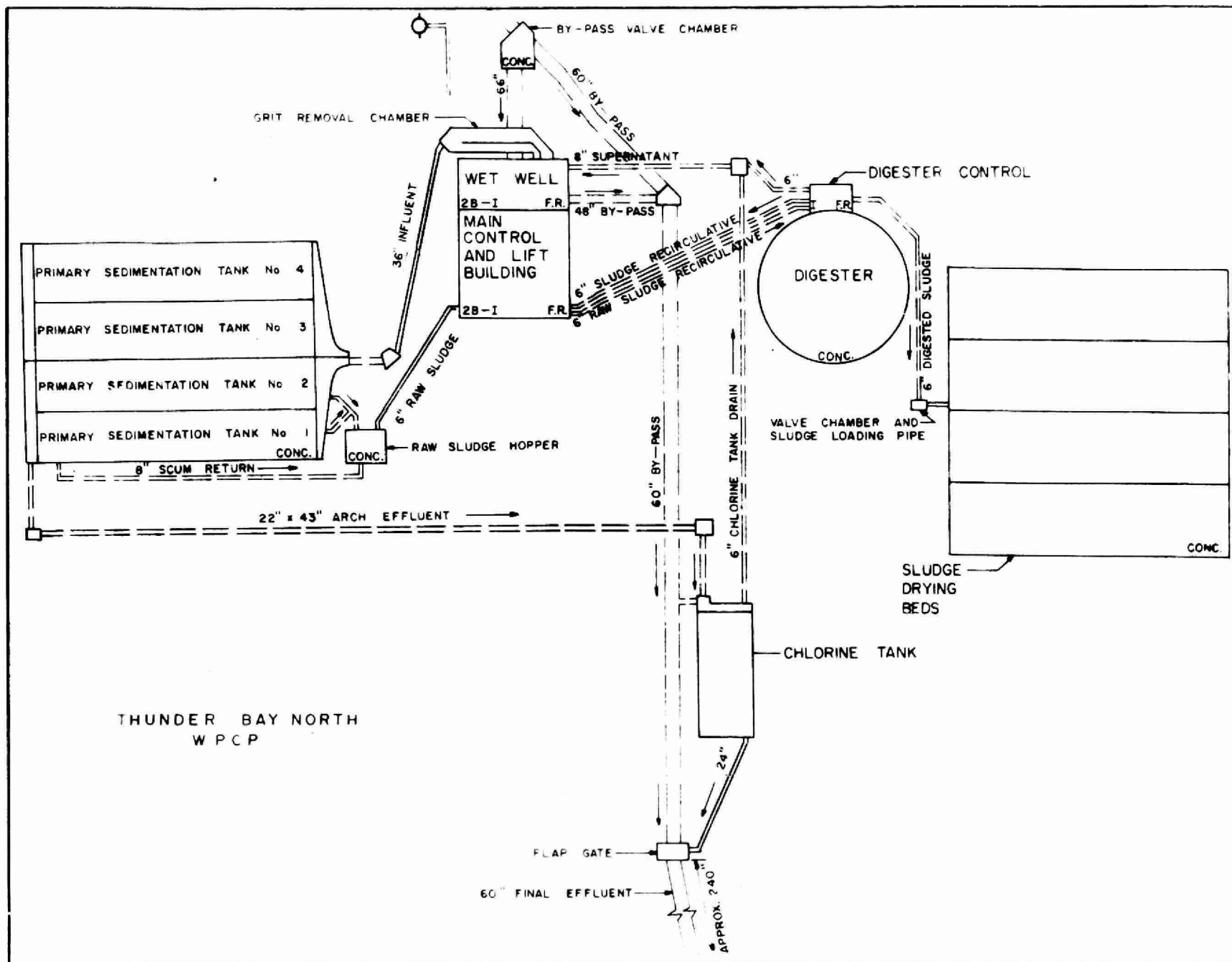
RAW SLUDGE TO DIGESTER
DIGESTED SLUDGE REMOVED ———

TREATMENT DATA

MONTH	GRIT	CHLORINATION		SLUDGE DIGESTION and DISPOSAL							
	QUANTITY REMOVED cubic feet	CHLORINE USED 10 ³ pounds	AVERAGE DOSAGE mg/l	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT	SLUDGE HAULED cubic yards
				QUANTITY 10 ³ gallons	TOTAL SOLIDS %	VOLATILE SOLIDS %	QUANTITY REMOVED 10 ³ gallons	TOTAL SOLIDS %	VOLATILE SOLIDS %	TOTAL SOLIDS %	
JAN	45	7.4	6.3	603	1.1	80	0	10.8	24	.1	0
FEB		6.6	6.1	501	2.1	82	0	4.1	45		0
MAR	150	.5	1.1	347			189				1122
APR	70	5.6	2.6	321	3.8	73	70	8.0	46		418
MAY	369	6.5	3.3	395	3.8	82	0	1.3	37		0
JUNE	385	6.8	3.8	301	2.6	63	39	5.6	40		231
JULY	291	6.6	3.4	320	6.9	58	82	14.0	34		484
AUG	240	7.0	4.3	329	4.7	65	83	24.6	23		495
SEPT	760	6.9	4.6	368	5.3	50	44	7.3	52		264
OCT	620	6.9	4.8	532	4.4	59	254	14.2	32		1507
NOV	1059	4.9	3.6	385	3.6	67	0	8.8	43		0
DEC	478	6.8	5.8	381	1.5	63	0	14.0	31		0
TOTAL	4467	72.5	—	4873	—	—	761	—	—	—	4521
AVG.	2.4 cubic feet/mil gal	6.0	3.9	399	3.6	67	63	10.2	37	.1	378



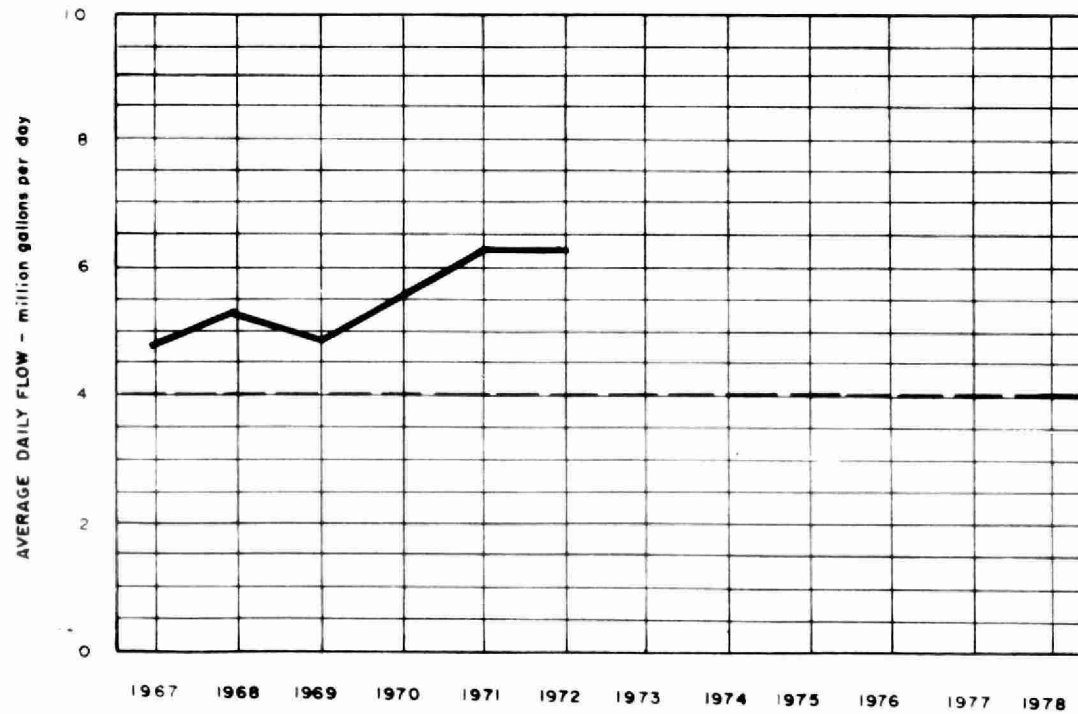
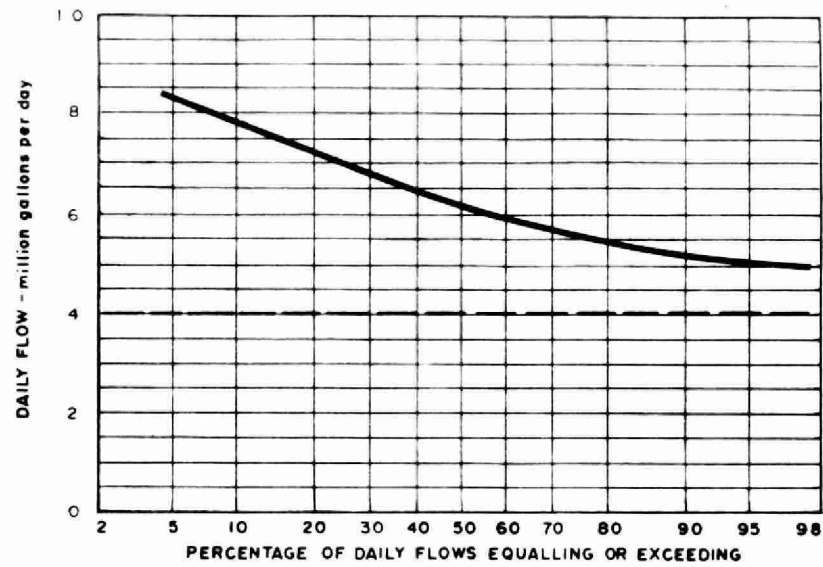
NORTH PLANT



DESIGN DATA

PROJECT NO.	2-0013-58	<u>PRIMARY TREATMENT</u>	Loading: Surface, 560 gal/ft ² /day Weir, 6,000 gal/ft/day
TREATMENT	Primary	<u>Grit Removal</u>	<u>CHLORINATION</u>
DESIGN FLOW	4.0 mgd	Type: Channels; mechanically cleaned (Rex San.) Size: Two 35' x 3' x 5' deep (6,540 gal) Retention: 4.7 min (two channels) Flow Velocity: 0.248 fps	Type: W & T Size: One 500 lb/day
DESIGN POPULATION	40,000	<u>Comminution</u>	<u>Chlorine Contact Chamber</u>
		Type: Barminutor Size: One Model B (35") One Model A1 (48")	Size" 45' x 20' x 10' Retention: 20 min
		<u>Sewage Lift Pumps</u>	<u>OUTFALL</u>
		a) Type: Chicago Pumps (ele) Size: Two 4150 gpm @ 50' tdh	- 240' of 60" dia corrugated pipe to McIntyre River
		b) Type: Fairbanks-Morse (diesel) Size: One 29,000 gpm @ 33' tdh	<u>SLUDGE HANDLING</u>
		<u>Primary Sedimentation</u>	<u>Digestion System - Single-stage</u>
		Type: Jeffrey Size: Four 100' x 18' x 8' deep (356,000 gal) Retention: 2.14 hr	Type: Mixed by recirculation; floating cover Size: One 50' dia x 20' swd (50,000 cu ft or 0.312 mil gal) Loading: 2.0 lb/cu ft/mo
			<u>Drying Beds</u>
			Size: Four 100' x 25' (10,000 sq ft)

FLOWS

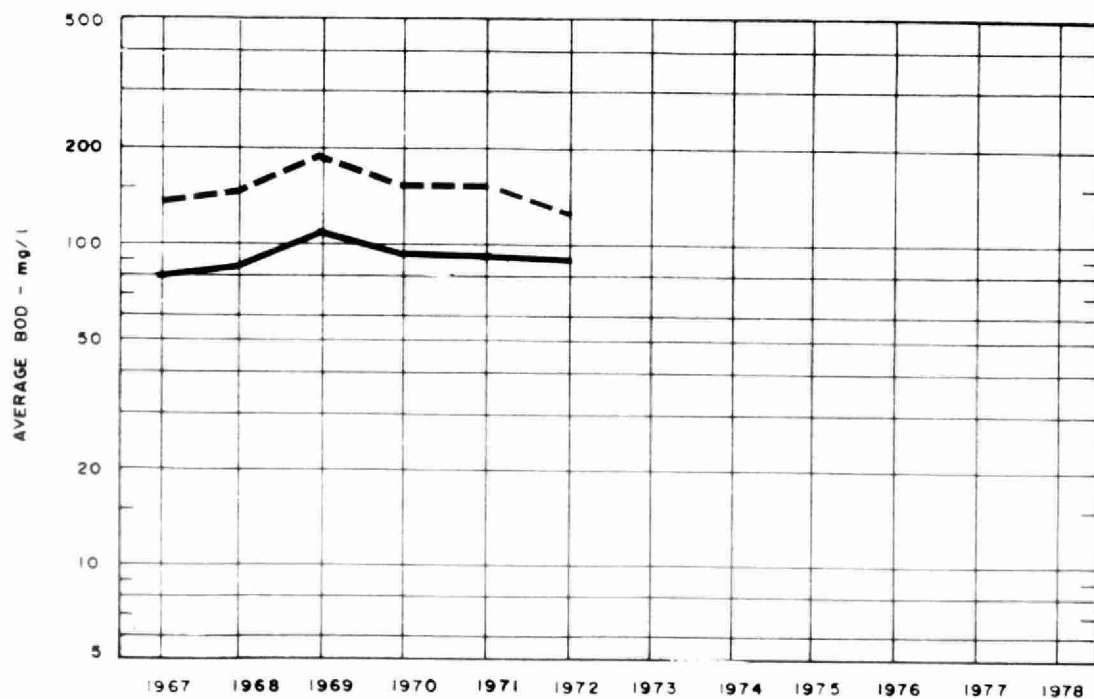
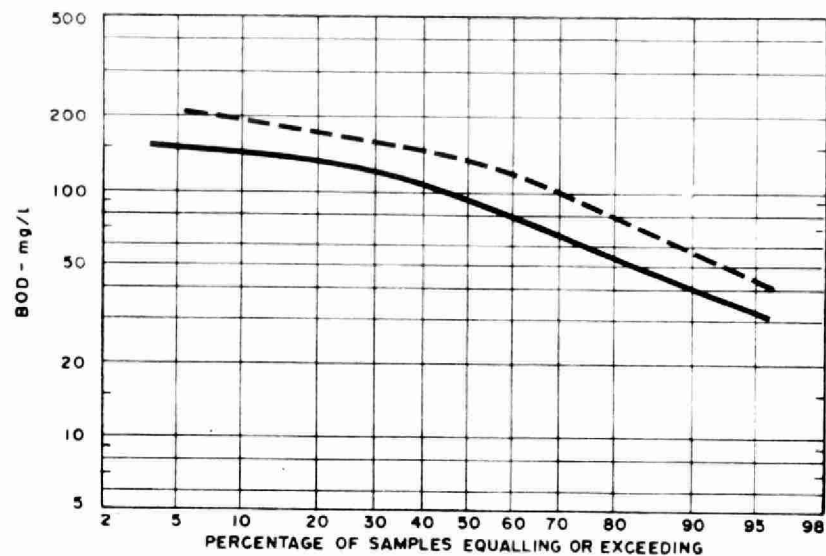


DESIGN CAPACITY -----

PLANT PERFORMANCE

MONTH	FLOWS			BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				PHOSPHORUS	
	TOTAL FLOW	AVERAGE DAY	MAXIMUM DAY	INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT
	million gallons	mil. gal	mgd	mg/l	mg/l	%	10 ³ pounds	mg/l	mg/l	%	10 ³ pounds	mg/l P	mg/l P
JAN	184	5.9	7.1	163	122	25	73	176	84	52	169	7.2	7.1
FEB	161	5.6	6.5	183	100	45	134	160	72	55	142	8.0	7.9
MAR	193	6.2	7.1	162	132	18	58	133	82	38	98		
APR	224	7.4	14.7	190	99	48	203	209	86	59	275	7.4	6.0
MAY	230	7.4	8.4	125	68	45	131	136	67	51	158	4.0	3.9
JUNE	204	6.6	7.8	71	48	32	47	144	81	44	128	5.5	4.6
JULY	220	7.1	7.9	121	82	32	86	137	82	44	124	5.9	5.3
AUG	17	6.0	7.2	135	71	47	120	181	79	56	191	5.2	4.1
SEPT	175	5.8	7.0	127	68	46	103	182	54	70	223	7.2	4.4
OCT	184	5.9	6.7	150	101	33	90	154	69	55	156		
NOV	167	5.6	6.2	137	105	23	53	155	77	50	130	6.4	4.7
DEC	168	5.4	7.0	106	84	21	37	120	74	38	77	6.9	4.9
TOTAL	2297	-	-	-	-	-	1135	-	-	-	1881	-	-
AVG.		6.3	MAXIMUM 14.7	138	90	35	95	155	75	52	157	6.4	5.3
No. of Samples	-	-	-	55	55	-	-	55	55	-	-	10	10

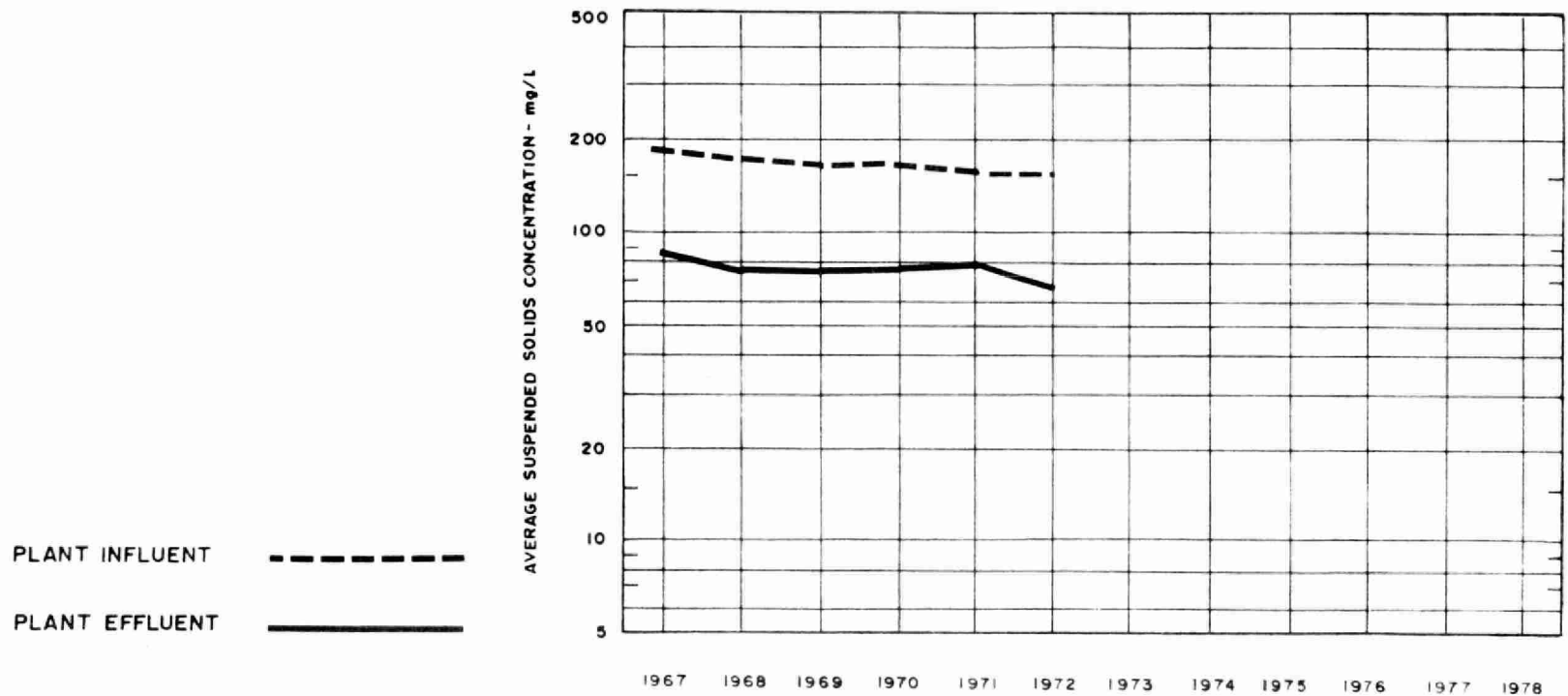
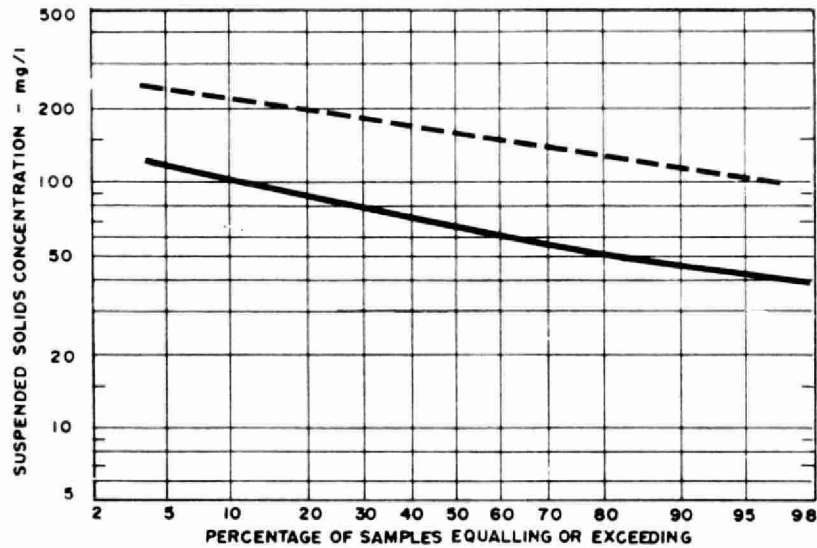
BIOCHEMICAL OXYGEN DEMAND



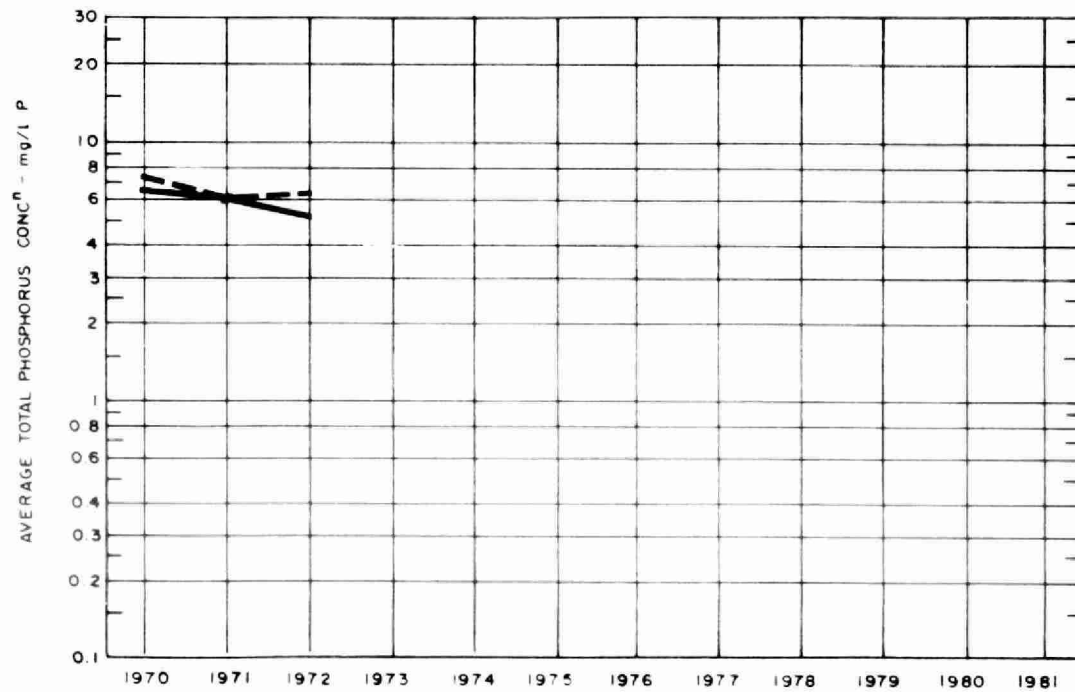
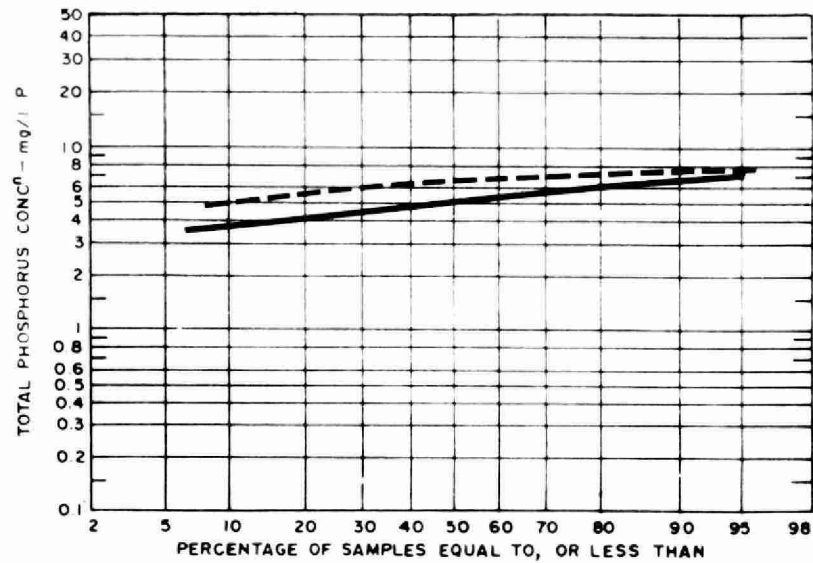
PLANT INFLUENT - - - - -

PLANT EFFLUENT —————

SUSPENDED SOLIDS



PHOSPHORUS

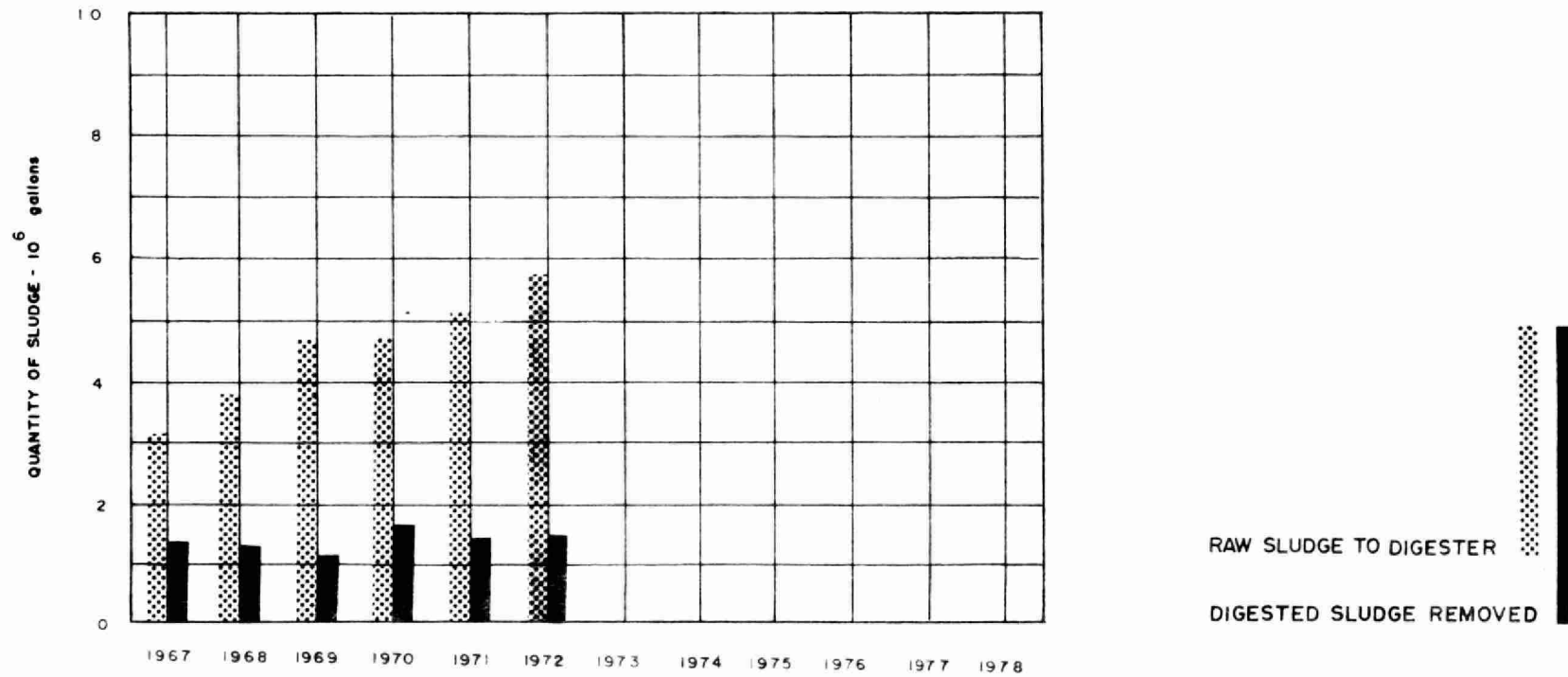
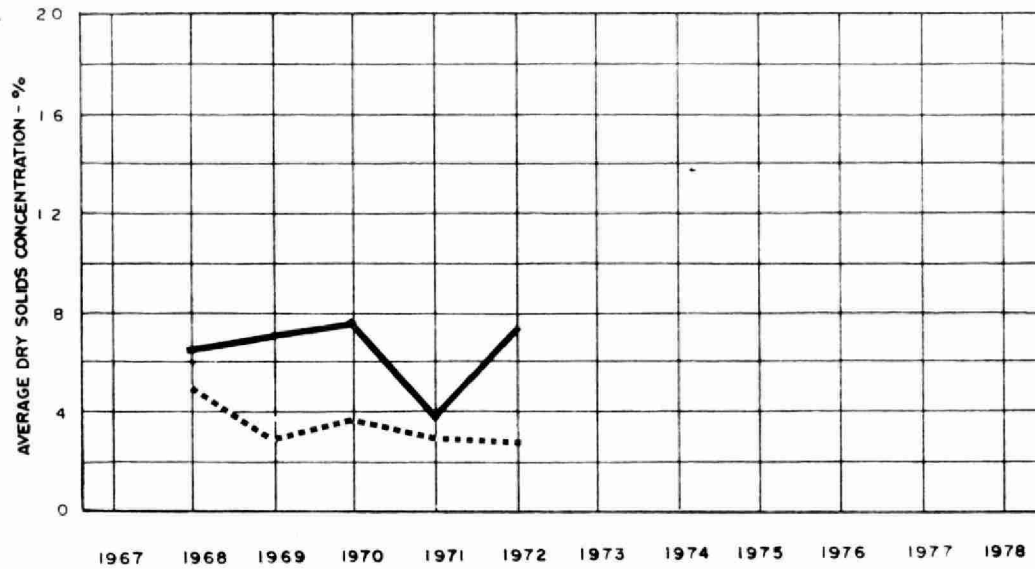


PLANT INFLUENT -----

PLANT EFFLUENT —————

DIGESTION

RAW SLUDGE
DIGESTED SLUDGE ———



RAW SLUDGE TO DIGESTER
DIGESTED SLUDGE REMOVED

TREATMENT DATA

MONTH	GRIT	CHLORINATION		SLUDGE DIGESTION and DISPOSAL							
	QUANTITY REMOVED cubic feet	CHLORINE USED 10 ³ pounds	AVERAGE DOSAGE mg/l	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT	SLUDGE HAULED cubic yards
				QUANTITY 10 ³ gallons	TOTAL SOLIDS %	VOLATILE SOLIDS %	QUANTITY REMOVED 10 ³ gallons	TOTAL SOLIDS %	VOLATILE SOLIDS %	TOTAL SOLIDS %	
JAN	47			437	1.6	34	14	8.9	74	.9	88
FEB	37			529	2.0	83	231	9.4	70		1375
MAR	62			518							
APR	124	1.8	3.2	551	2.5	79	180	1.4	71		1067
MAY	145	7.8	3.4	485	3.9	79		1.1	56		
JUNE	278	7.5	3.7	470	3.5	77	63	14.3	54		374
JULY	324	7.8	3.5	463	3.8	76	176	9.3	65		1045
AUG	132	7.6	4.1	515	3.2	79	235	6.0	62		1397
SEPT	105	7.1	4.0	471	3.8	76	341	8.1	76		2024
OCT	62	7.7	4.4	449			35				209
NOV	37	7.3	4.3	467	1.9	83	107	9.6	73		638
DEC	70	2.0	3.5	432	2.9	81	85	5.7	75		506
TOTAL	1423	56.6	—	5787	—	—	1467	—	—	—	8723
AVG.	.6 cubic feet/mil gal	6.3	3.8	482	2.9	67	122	7.4	67	.9	725

LABORATORY LIBRARY



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